

present in the emigration centers of these organs, not in very great numbers, but never absent. The same were also found nearer the surface, in the hyperplastic part of the interstitial tissue, but seldom in a gland, and if present, were external to the epithelial cells (Fig. 3). But here another highly interesting form not present in the liver was also found, namely, nearly circular groups of small round bodies, stained in the same manner as the oval bodies. It may be remarked here, that all these bodies in the duodenum and stomach stain a deeper blue than in the liver. The red color is perceptible only after protracted decoloration.

I might suggest that these blackberry forms represent sporulation. If these spores, developed in the higher layers of the mucous membrane, are set free, they may penetrate into the mucous glands or lymphatic vessels and be transported by the way of the bile ducts or lymphatics to the liver, but this can only be ascertained in a postmortem examination. It seems very probable that the infection is transferred to the liver in one of these ways.

By these observations, to be completed by observation on the living and dead, we can very well understand the source of the disease, which is first a true gastro-duodenitis, remaining such in the milder, lingering or endemic cases of some countries, but the danger of the epidemic form commences with the immigration of the protozoa into the liver.

That the infection with these organisms, showing the nearest relation to coccidia and amebæ, which immigrate into the liver from the duodenum, deprives yellow fever of its terror, is natural, as watery fluids, fruits, vegetables and greens only can be considered as carriers of the infection.

The kidneys are always altered in the graver cases of yellow fever. In 202 cases of yellow fever observed by Jones, albuminuria was found in 125 of the non-fatal, and in all the fatal cases (45), in all 170, or 84 per cent. The amount of albumin varied from a trace to 80 per cent. Yellow stained casts and scanty urine were considered unfavorable symptoms, according to the same observer. The kidneys were generally a "brownish-yellow, larger and softer than normal, loaded with fat, and were generally intensely congested" (in the medullary substance probably). This is the general aspect in every septic kidney, very similar to the kidney in acute atrophy of the liver.

The microscopic examination shows no inflammation of the kidneys (it is wrong to speak of parenchymatous nephritis in these cases, as there is no proliferation of epithelial cells, nor any migrative process in the interstitial tissue). The convoluted tubules of the cortex alone show alterations, being filled up and vastly distended by a granular exudation; the epithelial cells here are ragged, and often compressed by the exudation. The glomeruli are free, and are also sometimes compressed by the same exudation. In my cases, casts were not formed in so great a quantity as is found in true nephritis.

This affection could be considered as a toxic one, but the differences in the effects on kidneys by true bacteria toxins is very remarkable, affecting the glomeruli in scarlatina (glomerulo-nephritis), and in Asiatic cholera promoting the destruction of the nuclei of the secreting epithelial cells (karyolysis). With exception of the exudation into the glomeruli and tubules, only the fatty degeneration of the cortex in phosphorus and other intoxications resembles this affection in yellow fever.

This condition indicates a true dissolution and hindered oxygenation of the blood, beginning in life; but we should expect then to detect free hemoglobin in the urine.

I will repeat, that this new theory of yellow fever, announcing the affection as a gastro-duodenitis, with consequent atrophy of the liver, originated by certain protozoa, must be supported by the examination of yellow fever patients. I hope to fulfil this task, but I think that we will now be better prepared to meet this work of high pathologic and hygienic importance to the United States.

SUMMARY OF PATHOLOGIC AND BACTERIOLOGIC WORK DONE AT ISOLATION HOSPITAL, NEW ORLEANS, LOUISIANA.

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In presenting this paper I will limit its scope to the pathologic conditions found, and to the bacteriologic work done with the cultures obtained from the cases of yellow fever at the Isolation Hospital, principally to corroborate the claims of Sanarelli.

The pathology comprises the examination of urine and the blood, the autopsies and the bacteriologic research of Sanarelli's bacillus icteroides.

There were 348 specimens of urine and 154 of blood examined, and 51 autopsies were held. The 154 specimens of blood represent as many patients from whom blood was taken and examined. The examinations of urine were made as they generally are in the pathologic department of the Charity Hospital, only they were made oftener as a guide in the treatment of the cases. Albumin was found in all the cases of yellow fever during the course of the disease. It usually appeared before the fifth day, seldom after. Bile was also present in all the cases, usually appearing before the albumin or concomitantly. Except in mild cases renal casts were found and include the different varieties.

Blood examinations were made in every case when possible. These were made: 1, to determine the presence or absence of the malarial hematozoon; 2, to determine the influence of yellow fever on the bacillus of typhoid, Widal's reaction; 3, to determine the proportion of red and white blood corpuscles; 4, to determine the changes taking place in the blood; 5, to determine special reaction of yellow fever blood with the bacillus icteroides of Sanarelli; 6, to determine the percentage of hemoglobin; 7, to make cultures from the living blood.

The malarial hematozoon was frequently found, especially during the period of convalescence. The variety most frequently seen was the crescentic form, which belongs more especially to the estivo-autumnal type of malaria.

Though Widal's reaction was tested in all cases when practicable it invariably gave negative results. The method employed was Johnson's modification of that of Widal, *e.g.* one part of dissolved dried blood to ten parts of an attenuated pure culture of bacillus of typhoid, and the time limit was fifteen minutes. The solvent for the dried blood was either sterile bouillon or filtered sterilized rain water. In all cases

of yellow fever examined the test was invariably negative, and the few cases in which a positive reaction took place was found to be typical cases of typhoid fever.

The blood count made in yellow fever cases never gave below 4,280,000 red blood corpuscles, and in one case that proved fatal gave 5,000,000 to 1 cubic millimeter of blood. The white cells varied from 20,000 to 4,660.

The changes in the yellow fever blood were studied in fresh preparations and in colored specimens, these last being colored with the Ehrlich's Biondi's stain, and others with an aqueous solution of methyl violet beta; for these stained preparations four cover-glass smears were taken from each patient. In the fresh preparations, as a rule, no alterations could be detected in the corpuscles. Occasionally the corpuscles appeared vacuolated and crenated, but as these changes were more marked at the edges of the preparations and took place twenty to twenty-five minutes after they were made, these appearances were considered artificial and due most probably to evaporation and changes of temperature.

In the stained preparations the red corpuscles retained their normal aspect generally; occasionally a few vacuoles were found. The red corpuscles stained normally and the usual white corpuscles, lymphocytes, large and small, polymorphonuclear neutrophils, and eosinophiles are found. In a few specimens a few myelocytes were found, also normoblasts and extruded nuclei. I could not detect any increase in eosinophiles. In many of the preparations stained with methyl violet beta, these being made especially for the detection of bacteria, short rounded-end bacilli were found. Besides these, in a few preparations, long chains of slender bacilli were found associated with micrococci, usually in groups of two, and short rounded-end bacilli.

The agglutination reaction was applied to the following specimens of blood with the bacillus icteroides. The method employed was that of Wyatt Johnson, and the solution of dried blood was made in one series with sterile bouillon, and in the others with sterilized distilled water. In some, ordinary slides were used and in others hanging drops. The solution being one to ten the result was as follows:

Specimens examined on ordinary slides with sterile bouillon as solvent.

1. Ward No. 1, bed No. 2; preparation made at 4:08 P.M.; bacilli are less active at 4:55; no clumping at 5:00; a few clumps at 5:25 P.M.

2. F. Stellano; preparation made at 4:25 P.M.; bacilli are still active at 5:00; at 5:10 less active; at 5:18 P.M., clumping.

3. Chisolm; preparation made at 10:50 P.M.; examined until 12:10 P.M. without clumping or immotility.

4. Bed No. 9; preparation observed for thirty-two minutes; bacilli still active; slight clumping.

Second preparation from Chisolm prepared at 11:25 A.M.; observed until 12 M.; ringed with vaselin and then put into incubator until 3:40 P.M.; bacilli were still active; no clumps.

Third preparation from Chisolm at the same time, and solvent used being sterilized filtered water, and tested as above, the bacilli were found less active; no clumps.

5. My own blood, first preparation, solution one to ten made at 4:10 P.M.; observed twenty minutes ringed with vaselin; no clumping; bacilli active; put in incubator at 4:40 P.M.; next morning at 11:30 found majority of bacilli immotile.

Second preparation, one to five, made at 4:24 P.M.; observed fifteen minutes, ringed with vaselin; no clumping; bacilli active; put in incubator at 4:40; at 11:30 next morning majority of bacilli immotile.

6. Blood of Locassio, prepared at 11:15 A.M.; at 11:22 a few bacilli clumped; majority motile; at 1 P.M. put in incubator and examined at 4:45 P.M.; clumping still persisting; bacilli less active.

Ward No. 1, bed No. 9, made at 11:20 A.M.; at 11:27 some clumping; majority of bacilli motile; 12:02 P.M. bacilli still motile; examined until 1 P.M., when preparation was put in incubator and examined at 4:45 P.M.; bacilli less active; clumps persisting.

7. Frank French; preparation at 9:40 A.M.; examined for thirty minutes; bacilli forming; then small clumps; others motile; examined at intervals until 12 M., during which time bacilli were less active with clumps still persisting.

Hanging drops preparation:

8. Mary Stellano; first preparation; solution made with sterile bouillon at 4:40 P.M.; examined until 5:15 P.M., when a few clumps were noticed; other bacilli motile; examined until 5:25 P.M.; clumps persisting, while other bacilli were motile.

9. Will Kynion; preparation made at 10:22 A.M.; solution with sterilized distilled water, one to ten; examined until 1 P.M.; found bacilli clumping during that time, but bacilli in clumps are motile and majority of free bacilli motile; put in incubator until 4 P.M.; re-examined until 5 P.M.; clumping persisting; bacilli less active but still motile.

Mary Stellano; second preparation with sterilized distilled water, made at 10:35 A.M.; examined until 1 P.M.; clumping occurring, but majority of bacilli motile; put in incubator at 1 P.M. and re-examined at 4 P.M.; until 5 P.M. the clumps persisting and bacilli less active.

Locassio's blood; second preparation made at 4 P.M., as above; examined until 5 P.M., during which time slight clumping appeared; bacilli still motile; put in incubator and re-examined next day, finding persistence of clumps; bacilli less active.

10. Bed No. 25; preparation made at 4:04 P.M.; examined until 5 P.M.; no clumping; bacilli motile, and after being put in incubator were found motile next morning; no clumps.

11. Bed No. 9; prepared at 4:02 P.M.; examined until 5 P.M.; bacilli yet motile when put in incubator, and next morning found same condition; no clumps.

12. Bed No. 19; prepared at 4:22 P.M.; examined until 5:05 P.M., during that time a few clumps; found bacilli motile; put in incubator and re-examined at 9:30 next morning; bacilli motile though clumps persisted.

These are the only cases that I have had opportunity to test and the number is too small to allow any conclusions.

The percentage of hemoglobin was estimated with Gower's hemoglobinometer, using as a control test the percentage of hemoglobin obtained from one of the physicians of the hospital; this control gave 90 per cent. hemoglobin. The hemoglobin was tested in recent cases, during course of disease, and in convalescents. In the recent cases, and during the course of the disease the percentage of hemoglobin never exceeded 72 per cent., except in one case, which proved fatal, where it was found as high as the control, 90 per cent.; the lowest percentage in this series was 50. In convalescents the lowest percentage was 64 and the highest 80. These percentages show a decided loss of hemoglobin during the disease and a slow return to the normal in the convalescents.

The autopsies, fifty-one in number, are classified as follows: There were thirty-one in which none but the typical pathologic lesions of the disease were found; fourteen in which there were evidences of pre-existing chronic changes in the liver, the kidneys and blood vessels, these were more especially alcoholics; six that did not present any of the pathologic lesions of yellow fever. Of these last, one was a case of typhoid fever; the second one of general peritonitis from rupture of pus tubes; a third, general acute tuberculosis with chronic endocarditis, in an old negro man; the fourth, septicemia following pelvic peritonitis due to pus tubes; the fifth, tertiary syphilis; in this last case the culture tubes inoculated remained perfectly sterile; the sixth, was pneumonia in an alcoholic.

In all the autopsies from yellow fever cases the typical jaundice was uniformly present, more marked in some cases than in others, and the marked bluish

pink postmortem hypostasis about the dependent parts of body, face and neck was also noticeable. These appearances of the yellow fever cases formed a marked contrast with the other five, where the jaundice was not observed and the hypostasis less marked. All the tissues were generally found bile stained, in some instances very intensely.

On opening the bodies one of the first things that attracted attention was the marked fluidity of the blood contained in the heart and large vessels, and the congestion of the tissues.

The heart was usually full of blood, myocardium paler than normal, and fatty degeneration the rule. A special point of interest here was the intense congestion of the vasa vasorum of the large vessels at the base of heart, and also the congestion of the pericardium. In a few cases atheromatous changes of the valves of the heart and of the vessels were found.

The lungs were unusually free from chronic changes; the absence of tubercles, in the yellow fever cases, was the rule. In several where the mucous membrane of the trachea and bronchi was examined, it was found markedly congested, but not more than the surrounding organs.

The spleen was usually normal, except in a few cases where there was evidence of previous attacks of malaria, and chronic changes taking place.

The liver was generally found fatty, in some cases extremely so. The large vessels were usually dry but the portal capillaries congested to the extent, at times, of forming a marked delineation of the lobules. The gall bladder contained, as a rule, a small quantity of fluid and was seldom full. Besides these changes in the liver, in ten autopsies the organ was found cirrhotic.

The mesenteric vessels were generally full and gorged with blood and the different folds of the peritoneum universally congested. The mesenteric glands were usually normal.

The stomach presented the most characteristic congestion of its mucous membrane, which was swollen, red, eroded and contained hemorrhagic points in its substance. This congestion and changes, though universal throughout the organ, was more especially marked on the anterior wall of the organ and in the cardiac extremity, fading away as it reached the pylorus.

This congestion, less in intensity, extended as a rule to the mucous membrane of the duodenum, as far as the entrance of the common bile duct, beyond which it ceased in the majority of cases.

In a few cases the same condition observed in the stomach was found in the intestines, from cardiac extremity of stomach to rectum. In these the contents were of a dark meconium-like matter, of a black color and of very thick consistency. The same lesions found in the stomach were repeated in the mucosa of the whole intestinal tract.

The kidneys usually presented an acute inflammatory condition being congested, at times intensely so. In some cases infarcts were found, and also interstitial hemorrhages; these hemorrhages, usually small, attained in some the size of a pigeon's egg. Although generally in the substance of the organ, these hemorrhages were sometimes found in the pelvis and calices of the organ. The fatty degeneration was well marked, as a rule, and characteristic in its situation in the majority of autopsies. It was more marked in the cortex immediately at the edge of the malpighian

pyramids, forming arches around that border and radiating toward the cortex of the organ. In a few cases this degeneration was contrasted by the intense congestion in the same situation. This peculiar arrangement of the fatty degeneration was noticed in the first autopsy on a yellow fever case held in this city during the last epidemic and was afterward noted in every case. Out of the forty-five cases of yellow fever on which an autopsy was held at the Isolation Hospital this characteristic arrangement of the fatty degeneration occurred in thirty-five. In the ten remaining cases, I am told that it did occur, but as I did not find it recorded in the notes of the autopsies, I have not included them. Besides these marked changes, the kidney presented evidences of chronic changes in fourteen cases.

The brain was examined in only one case and the same congestion prevalent in other organs was also marked here. The meninges and surface of brain were intensely congested; the puncta vasculosa in the centrum ovale were decidedly marked and the whole organ was intensely congested; there was, however, no other sign of any inflammatory condition. The lack of time prevented us from making a more systematic examination of the nervous centers.

An average of five primary cultures were made at every autopsy; one from the blood of the heart and large vessels, one from the liver, one from the spleen, one from the kidneys and one from the lungs. In several cases, pieces from organs (liver, kidneys and spleen) were carefully removed and enclosed in antiseptic and aseptic wrappers and incubated for twelve to fourteen hours, and then inoculated in culture media.

As these did not give as a rule, any better results than the cultures obtained at autopsies, on account of the great loss of time entailed and the difficulty in transporting these pieces to the laboratory, the practice was abandoned. This made an aggregate of 255 primary cultures obtained from autopsies; of these a few remained totally sterile. Those that gave cultures were plated as soon as practicable after the autopsy. The primary cultures considered the best for the purpose were chosen for these plates, and cultures were made to test their purity. Several of these second cultures had to be plated over, in the attempt to eliminate the contaminating bacteria. The bacillus coli communis was found omnipresent, and difficult to eliminate, also in a few autopsies, a form of proteus with fluorescence. Several autopsies continued to produce the bacillus coli communis after several platings. The tests applied were the cultivation in ordinary bouillon, in peptone solution for the indol test, in litmus milk, in glucose and lactose bouillon, in gelatin, the plating of pure cultures, staining by Gram's method, replanting in tubes and inoculation of animals.

After having plated all the autopsies and recognizing that in several plates characteristic growths were present it was impossible to carry through all of them. I chose three that from their appearance and examination led me to believe that I had obtained a pure culture, and subjected them to the different tests described above, and carried on the experiments on animals with them. In all the different tests a pure culture of bacillus icteroides Sanarelli was used as comparison. These cultures, when subjected to the tests as described by Sanarelli, in his memoir, were found to be of slow growth in ordinary bouillon, showing a slight

cloudiness in twenty-four hours. It is a short automotile bacillus and produces marked fermentation in glucose bouillon; in lactose bouillon a very faint fermentation; in peptone solution, after twenty-four and forty-eight hours growth, gives no indol reaction, without addition of nitrites, and, when these are added, the reaction is very faint after twenty-four hours incubation; cultivated in litmus milk, even after twenty days incubation, there is no coagulation of milk and the color is not apparently changed; when subjected to Gram's method, they do not take up the stain.

In one of the autopsies (No. 40) the growth was obtained with difficulty, being exceedingly slow in ordinary bouillon and on agar the growth was scant. This culture, inoculated in a rabbit, gave a pure culture more active and vigorous than the first, and after again subjecting it to the tests it was used as a pure culture giving better growths. These cultures in gelatin did not liquefy.

The experiments on animals were eighteen in number. In the inoculation of animals one is generally inoculated with a twenty-four hours bouillon culture of bacillus icteroides Sanarelli, as control, and the other or others with the same quantity of a bouillon culture of the same age, from the cultures to be tested.

The animals injected were two guinea pigs, fourteen rabbits and two dogs. Of these the two guinea pigs were injected with juice of organ mixed with sterile bouillon; No. 1 from juice of liver from autopsy No. 2; and No. 2 from kidney of same autopsy. The result is as follows: Guinea pig No. 1 was injected on Oct. 1, 1897, at 5 P.M., with 1.17 c.c. of an emulsion of equal parts of sterile bouillon and liver juice, in the peritoneal cavity. Animal did not eat at evening feeding; Oct. 2, 1897, did not eat and is quiet, does not care to move; at 12 M. animal in dying condition; at 12:30 P.M., found dead in cage, being nineteen and one-half hours after inoculation. Autopsy at 4:30 P.M.: postmortem rigidity marked; peritoneal cavity contains good quantity of fluid; membrane ecchymotic and congested; is smeared with purulence and the ecchymotic patches on diaphragm; lungs congested and ecchymotic; heart contracted and contains slight amount of blood; liver congested with ecchymoses in organ; kidneys, ecchymoses on surface. Cultures were made from different organs. Guinea pig No. 2, injected in same manner, presented same lesions.

Four rabbits were injected with pure cultures of Sanarelli bacillus icteroides; two with pure culture from autopsy No. 46, one with culture from postmortem No. 11, one from postmortem No. 6, two from autopsy No. 1, one from autopsy No. 40, two from autopsy No. 37 and one with Sternberg's bacillus X.

The four rabbits injected with Sanarelli's bacillus presented the following appearances at the autopsy:

Rabbit No. 2, weighing 1740 grams, injected Nov. 5, 1897, at 11:37 A.M., with 1.23 c.c. icteroides bacillus, seventh day bouillon culture, in vein of ear, died during night of November 6, and being found dead in its cage at 7 A.M. Autopsy at 8:20 A.M.; the weight was 1575 grams, being a loss of 165 grams from time of injection twenty-three and one-half hours. Postmortem rigidity marked; small amount of fluid in peritoneum, otherwise normal; liver congested and studded all over with yellowish spots; on section, foci of suppuration were found; spleen full, enlarged and congested; kidneys congested and yellowish; heart filled with blood, organ somewhat pale; lungs intensely congested; urinary bladder contained 2 c.c. of urine, albuminous, with casts and renal epithelium.

Rabbit No. 3, needle having slipped, was injected in subcutaneous tissue of ear, Nov. 5, 1897, with 1.23 c.c. of bacillus icteroides. It died during night of 10th. The same yellow spots appear in liver as were found in No. 2; spleen congested;

kidneys appear smaller; heart and lungs apparently normal; urinary bladder greatly distended, contains 25 c.c. of urine; stomach contracted and contains no food, but a dark brownish fluid, walls apparently normal; had convulsions before death. Urine contains 20 per cent. moist albumin, hyalin and granular casts and renal epithelium.

Rabbit No. 8, weighing 1485 grams, injected Dec. 19, 1897, with 4.5 c.c. of a twenty-four hours bacillus icteroides in bouillon, died Dec. 20, at 5 P.M. At autopsy, December 21, 9:30 A.M., weight 1470 grams; rigidity marked; conjunctiva injected; lungs, petechiae on surface and congested; heart, petechiae on surface and congested at base, filled with partly fluid blood; liver congested, some yellowish discoloration disseminated throughout organ; spleen congested and enlarged; kidneys congested, yellowish spots throughout organ; bladder contains 10 c.c. albuminous urine and gives reaction of bile; stomach, mucosa intensely congested, swollen, petechiae in mucosa and eroded, especially marked around cardia; all tissues are intensely congested.

Rabbit No. 11, weighing 1827 grams, injected Jan. 1, 1898, at 11 A.M. with 5 c.c. bacillus icteroides bouillon culture sixteen hours old, died at 10:30 A.M. January 18; postmortem same day. Postmortem rigidity marked; subcutaneous connective tissues intensely congested; heart filled with black fluid blood; liver congested; spleen intensely congested and enlarged; kidneys congested; stomach is intensely congested and contains blackish brown fluid mixed with food. During life conjunctiva were intensely congested.

Rabbits No. 6 and 12 were injected with cultures from autopsy No. 46. No. 6, weighing 1780 grams, injected at 11:40 A.M., Dec. 19, 1897, with 3.5 c.c. of 24 hours bouillon culture, from postmortem No. 46, died between 8 and 9 A.M., December 20, weighing 1735 grams. Autopsy that A.M., showed rigidity marked; conjunctiva injected, can see through cornea streaks of injected vessels; gums, small red lines over incisors; lungs, petechiae on surface; heart filled with fluid blood; liver congested, organ appears granular from the intensity of the congestion; gall bladder empty; spleen congested and enlarged; kidneys congested with petechiae on surface, contains whitish yellow spots, stomach mucosa intensely congested and contains petechiae and erosions filled with food; urinary bladder distended with 16 c.c. albuminous urine. Rabbit No. 12, injected with same culture presents same lesions Jan. 16, 1898.

Rabbit No. 1, which was injected with culture from autopsy No. 6, did not present any characteristic lesions, except the liver, which contained a large number of yellowish foci resembling tubercles undergoing cheesy degeneration; spleen normal in size.

Rabbit No. 4, injected with a culture from postmortem No. 11, presented nothing of mark, except the same lesions of the liver as were found in rabbit No. 1, and in both the urinary bladder was empty.

Rabbits Nos. 7 and 13 were injected with a culture obtained from postmortem No. 1.

Rabbit No. 7, weighing 1680 grams, was injected Dec. 19, 1897, at 12 M. with 4 c.c. of twenty-four hours bouillon culture from postmortem No. 1, died between 8 and 9 A.M. Dec. 20, 1897, weighing 1650 grams. At autopsy which was held the same morning, postmortem rigidity marked; conjunctiva congested; heart filled with partly fluid blood, congested at base; lungs congested, marked petechiae, which are large; liver congested and many yellowish spots, capillaries congested; spleen congested and enlarged; kidneys are congested and appear swollen, some yellowish discoloration; stomach mucosa intensely congested, contain petechiae, especially around cardia; duodenum, mucosa swollen and markedly congested; urinary bladder distended with 20 c.c. albuminous urine which gives bile reaction. Rabbit No. 13 gives same lessons.

Rabbit No. 14, weight 2151 grams, was injected Jan. 15, 1898, at 11:40 A.M. with 5 c.c. bouillon culture sixteen hours old, from postmortem No. 40, and died during the night of January 20, weighing 1930 grams. Postmortem January 21, at 12:30 P.M., showed pericardium very much congested; heart dilated and filled with fluid blood; spleen congested and enlarged, of dark color; liver congested, appears enlarged and contains yellow spots throughout, probably fatty degeneration; kidneys congested; lungs very much congested; stomach intensely congested.

Rabbit No. 10, weighing 1551 grams, was injected Dec. 27, 1897, with 3½ c.c. bouillon culture twenty-four old from postmortem No. 37. For several days thereafter temperature ranged from 105 to 106 degrees; never had bile nor albumin in urine, which was obtained by catheterization; became cachectic and emaciated, and on January 8, could not stand up. January 9, it was chloroformed to death. The weight was 1300 grams; all organs appeared pale but did not present any marked

changes: stomach contained food and was normal; bladder extremely distended with urine, but could not measure quantity as it ruptured on opening animal.

Rabbit No. 5, weighing 1130 grams, was injected Nov. 5 1897, at 11:27 A.M., with 1.23 c.c. of a twenty-four hours bouillon culture of Sternberg bacillus X. Twenty-four hours after the animal was sick, refused to feed and remained quiet, and after forty-eight hours began to eat some, but was still quiet and did not care to move. Emaciated gradually and became unable to stand up November 21; died on the 25th. At autopsy animal was found very much emaciated; liver contained a few small yellowish spots disseminated through the organ, which was red; heart filled with clotted blood; lungs dark red; spleen normal; kidneys swollen; stomach contains food; gall bladder distended, urinary bladder contained 50 c.c. urine, which was not albuminous.

Rabbit No. 9, though injected, is still alive and has a small abscess of ear. Was injected with culture from autopsy No. 37.

From the foregoing it will be seen that the cultures obtained from autopsies Nos. 1, 40 and 46 give the same lesions as that of the bacillus icteroides of Sanarelli, and these three cultures also give the same bacteriologic reaction when submitted to the different tests characteristic of the bacillus icteroides.

Besides these rabbits two dogs have been inoculated.

Dog No. 1, unfortunately, died of chloroform narcosis while he was being injected, but is interesting on account of the rapidity with which the bacilli were disseminated through the organs. He had been injected in a vein of the hind leg, and five minutes hardly elapsed between the time of injection and the time that the organs were reached, during the autopsy, yet all the organs gave pure cultures of bacillus icteroides and the blood from left heart was found swarming with bacilli.

Dog No. 2 was also injected Jan. 11, 1898, with 5 c.c. of a 72 hours bouillon culture of bacillus icteroides, partly in the circulation and partly subcutaneously, as the animal moved and the needle slipped out of the vein. During the first twenty-four hours it was sick and nauseated; temperature reached 105 degrees, but it gradually recovered, and on January 16 was re-injected subcutaneously with 10 c.c. lactose bouillon culture bacillus icteroides. It became sick as at first, but to a less extent. After three or four days it had sufficiently recovered to break loose from its place of confinement and was allowed to escape.

With the exception of two, the cultures made from living blood obtained from ten patients remained sterile. The blood was obtained from the veins of the patient through a sterilized glass syringe. One or two c.c. were drawn and immediately inoculated from the syringe into culture tubes. One specimen was obtained from a patient that was bled and several tubes inoculated. Of these two cultures obtained from the blood we have not yet obtained any definite results.

From the foregoing we may conclude:

- 1, that albuminuria and presence of bile in the urine is a constant symptom in yellow fever, appearing about the fourth day in mild and earlier in severe cases;
- 2, that the presence of the malarial hematozoon does not preclude the possibility of yellow fever;
- 3, that in solutions one to ten the yellow fever blood does not give any reaction with pure cultures of the typhous bacillus;
- 4, that if we except the diminution of hemoglobin, the blood does not show any marked changes;
- 5, that the most characteristic pathologic changes in the organs are the marked steatosis and congestion of liver, kidney and heart, the marked congestions, erosions and hemorrhages of the stomach and intestines and, usually, absence of lesions in the spleen and lungs. The other tissues present a marked icterus and congestion;
- 6, that the bacillus which we isolated and with which we have experimented is identical with that reported by Sanarelli as the bacillus icteroides, and the results obtained would justify us in considering it the special cause of yellow fever.

NEUROTIC ECZEMA.

Presented to the Section on Cutaneous Medicine and Surgery at the Forty-eighth Annual Meeting of the American Medical Association, at Philadelphia, Pa., June 1-4, 1897.

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The recognition and management of eczema must ever be an interesting and profitable study to the physician, because practically it forms a very large share of the cases of skin disease coming under his care. Even in dermatologic practice, where the rarer diseases and also the minor ailments of the skin contribute to make a considerable proportion of the whole number, it constitutes nearly one-third of all cases. In a recent analysis of 10,000 miscellaneous skin cases in the writer's private practice, there were 3201 patients with eczema, they forming 32.01 per cent. of the whole number. In ordinary private general practice, where many infantile cases occur, this disease undoubtedly forms over one-half of all the cutaneous diseases coming for treatment.

Neurotic eczema is particularly interesting to the general physician, because if recognized and rightly treated not only are the results commonly very satisfactory, but the patient also receives much improvement in general health by the measures calculated to benefit the eczema. Neurotic eczema should always be recognized as the signal flag of danger and should never be passed over with attempts to gain relief from local treatment alone, which can only be of minor and temporary benefit.

The influence of the nervous system in the production of skin lesions of various kinds has long been recognized and is now abundantly established, both by pathologic and clinical proof. Its influence in producing and prolonging eczema was very fully elaborated by the present writer¹ some time ago, and reference will here be made to some of the evidence then collected, as well as to more recent clinical experience.

Neurotic eczema is seen in both sexes and in all ages, from the cradle to the grave, although it is much more common in certain periods of life than in others. In infancy it is frequently observed in connection with cutting of the teeth, fresh eruptions occurring as each new tooth presses on the swollen and tender gum. In childhood it is less common, but may appear with each occurrence of nerve-strain, whether from overwork in school or over-excitement in recreation. The same is true in youth, where the changes of puberty come in as a factor, especially in females. But its most frequent time of occurrence is during that active period of existence between 20 and 55 years of age, when the strain and burden of life falls heavily on so many and when the strongest constitutions too often show many evidences of breakdown, both in the nervous system and in other directions.

Something can be learned of this from the following tables. The first relates to nearly 6000 cases of eczema, occurring among 20,000 miscellaneous skin cases in my public and private practice. The second table is constructed to show the percentage of eczema patients at different periods of life, as compared with the number of individuals alive at the same age, as shown by the life tables of insurance companies.

¹ "On the Relation of Eczema to Disturbances of the Nervous System." —Medical News, Philadelphia, Jan. 31 and Feb. 7, 1891.